		Smart Skies	
		2007 Science	
		Grade Expectati	ons
Vermont Science			
Grades 5-6			
Activity/Lesson	State	Standards	
			Identifying multiple variables that affect a system
			and using the variables to generate
			experimental questions that include cause and
Fly by Math	VT	SCI.5-6.S5-6:1.2	effect relationships.
			Collecting data and recording accurate and
Fly by Math	VT	SCI.5-6.S5-6:4.2	complete data from multiple trials.
			Explaining data using correct scientific
Fly by Math	VT	SCI.5-6.S5-6:7.1	
			Considering all data when developing an
Fly by Math	VT	SCI.5-6.S5-6:7.3	explanation/conclusion.
		001 5 0 05	Measuring and calculating speed (the distance
		SCI.5-6.S5-	an object moves over a measured amount of
Fly by Math	VT	6:19.1	time).
Floring NA - 41-	\	SCI.5-6.S5-	Speed indicates the rate at which an object is
Fly by Math	VT	6:19.a	traveling.
Floring NA - 41-	\	SCI.5-6.S5-	Speed is a relationship between the distance an
Fly by Math	VT	6:19.b	object travels and time elapsed.
			Design an investigation to collect evidence
		0015005	about an object's inertia and explaining their
Floring NA - 41-	\	SCI.5-6.S5-	observation in terms of the object's tendency to
Fly by Math	VT	6:20.1	resist a change in motion.
			Inertia is the tendency of an object to resist a
			change in motion and depends upon the object's
			mass. Stationary objects tend to remain
Fly by Moth	VT	SCI.5-6.S5-	stationary; moving objects tend to continue
Fly by Math	VI	6:20.a	moving (Newton's First Law). Investigating variables that change an object's
			,
		SCI.5-6.S5-	speed, direction, or both, and identifying and
Ely by Moth	VT	6:21.1	describing the forces that cause the change in motion.
Fly by Math	VI	SCI.5-6.S5-	
Fly by Math	VT	6:21.a	A force applied to a moving object will change the object's speed, direction or both.
riy by ivialli	VI	SCI.5-6.S5-	the object's speed, direction of both.
Fly by Math	VT	6:21.b	Friction is a force that often opposes motion.
riy by ivialli	VI	0.21.0	Gravity is the force that holds objects to the
			earth's surface, keeps planets in orbit around
		SCI.5-6.S5-	the sun, and governs the rest of the motion in
Fly by Math	VT	6:22.a	the solar system.
I IY DY Matri	VI	SCI.5-6.S5-	The force of gravity pulls toward the center of
Fly by Math	VT	6:22.b	mass of an object.
i iy by iviatii	VI	0.22.0	Measuring and calculating speed (the distance
		SCI.5-6.S5-	an object moves over a measured amount of
Line Up with Math	VT	6:19.1	time).
Line Op with Math	VI	SCI.5-6.S5-	Speed indicates the rate at which an object is
Line Up with Math	VT	6:19.a	traveling.
Line Op with Math	V I	SCI.5-6.S5-	Speed is a relationship between the distance an
Line Up with Math	VT	6:19.b	object travels and time elapsed.
Line Op with Math	V I	0.13.0	טטןבטו וומיכוס מווט וווווכ כומףסכט.

			Design an investigation to collect evidence
			about an object's inertia and explaining their
		SCI.5-6.S5-	observation in terms of the object's tendency to
Line Up with Math	VT	6:20.1	resist a change in motion.
			Inertia is the tendency of an object to resist a
			change in motion and depends upon the object's
			mass. Stationary objects tend to remain
		SCI.5-6.S5-	stationary; moving objects tend to continue
Line Up with Math	VT	6:20.a	moving (Newton's First Law).
			Investigating variables that change an object's
			speed, direction, or both, and identifying and
		SCI.5-6.S5-	describing the forces that cause the change in
Line Up with Math	VT	6:21.1	motion.
		SCI.5-6.S5-	A force applied to a moving object will change
Line Up with Math	VT	6:21.a	the object's speed, direction or both.
		SCI.5-6.S5-	
Line Up with Math	VT	6:21.b	Friction is a force that often opposes motion.
			Identifying real world objects that demonstrate
		SCI.5-6.S5-	and utilize a magnetic force field acting over a
Line Up with Math	VT	6:25.1	distance.
		SCI.5-6.S5-	Magnetism is a force field that acts over a
Line Up with Math	VT	6:25.a	distance.
			From earth, the moon and the sun appear to be
		SCI.5-6.S5-	the same size because the moon is so much
Line Up with Math	VT	6:45.a	closer to the earth than the sun.
		Smart Skies	
		2007 Science	
Vermont Science		Grade Expectati	
Grades 7-8			
Activity/Lesson	State	Standards	
Activity/Ecoson	Otate	SCI.7-8.S7-	
Fly by Math	VT	8:3.1.c	A control for comparing data when appropriate.
T Ty Dy Watti	VI	SCI.7-8.S7-	Identification of tools and procedures for
Fly by Math	VT	8:3.1.d	collecting data and reducing error.
T Ty by Watti	VI	0.0.1.0	Using technology to collect, quantify, organize,
Fly by Math	VT	SCI 7-8 S7-8·4 2	and store observations (e.g., use of probe).
T Ty by Watti	VI	001.7-0.07-0.4.2	and store observations (e.g., use or probe).
			Identifying, considering and addressing
			experimental errors (e.g., errors in experimental
Fly by Math	VT	SCI 7-8 S7-8·6 1	design, errors in data collection procedures).
T Ty Dy Watti	VI	301.7-0.37-0.0.1	design, errors in data conection procedures).
Fly by Math	VT	SCI 7-8 S7-8·7 2	Generating alternative explanations.
T Ty by Watti	VI	001.7-0.07-0.7.2	Using mathematical analysis as an integral
Fly by Math	VT	SCI 7-8 S7-8·7 5	component of the conclusion.
i iy by ividiii	V 1	001.7-0.07-0.7.0	Identifying additional data that would strengthen
Fly by Math	VT	SCI 7-8 S7-8·8 1	an investigation.
i iy by iviatii	V I	JOI.1-0.01-0.0.1	Describing and explaining how the acceleration
			of an object is proportional to the force on the
		SCI.7-8.S7-	object and inversely proportional to the mass of
Fly by Math	VT	8:19.2	the object.

		SCI.7-8.S7-	Velocity indicates the speed and the direction of
Fly by Math	VT	8:19.a	a moving object.
			Momentum is the characteristic of an object in
			motion that depends on the object's mass and
			velocity. Momentum provides the ability for a
		SCI.7-8.S7-	moving object to stay in motion without an
Fly by Math	VT	8:19.b	additional force.
			Acceleration is a relationship between the force
		SCI.7-8.S7-	applied to a moving object and the mass of the
Fly by Math	VT	8:19.c	object (Newton's Second Law).
			Diagramming or describing, after observing a
			moving object, the forces acting on the object
			before and after it is put into motion (Students
		SCI.7-8.S7-	include in their diagram or description, the effect
Fly by Math	VT	8:21.1	of these forces on the motion of the object.)
i iy by iviatii		0.21.1	An object that is not subjected to a force will
		SCI.7-8.S7-	continue to move at a constant speed and in a
Fly by Math	VT	8:21.a	straight line.
i iy by iviatii	VI	0.21.a	If more than one force acts on an object along a
			straight line, then the forces will reinforce or
		SCI.7-8.S7-	cancel one another, depending on their direction
Fly by Math	VT	8:21.b	and magnitude.
riy by Matri	VI	SCI.7-8.S7-	Unbalanced forces will cause changes in speed
Cly by Moth	VT	l l	
Fly by Math	VI	8:21.c	or direction of an object's motion.
Ch. b. Math		SCI.7-8.S7-	The force of gravity is hard to detect unless at
Fly by Math	VT	8:22.b	least one of the objects has considerable mass.
			Creating a diagram, model, or analogy to
			explain differences among conduction,
			convection, and radiation, and using their visual
		201 - 20-	to explain how heat energy travels in different
	_	SCI.7-8.S7-	directions and through different materials by
Fly by Math	VT	8:23.2	each method of energy transfer.
		SCI.7-8.S7-	Temperature is a measure of the rate of motion
Fly by Math	VT	8:23.b	of the molecules in a substance.
			Identifying and labeling the location of the sun in
		SCI.7-8.S7-	our solar system and its relationship to the
Fly by Math	VT	8:45.1	galaxy.
		SCI.7-8.S7-	
Line Up with Math	VT	8:12.a	Atoms and molecules are in perpetual motion.
			Increased temperature of substances causes
		SCI.7-8.S7-	increased motion of the atoms and molecules in
Line Up with Math	VT	8:14.a	the substance.
		SCI.7-8.S7-	Velocity indicates the speed and the direction of
Line Up with Math	VT	8:19.a	a moving object.
			Momentum is the characteristic of an object in
			motion that depends on the object's mass and
			velocity. Momentum provides the ability for a
		SCI.7-8.S7-	moving object to stay in motion without an
Line Up with Math	VT	8:19.b	additional force.

Fly by Math	VT	SCI.9-12.S9- 12:19.3	an object which has horizontal and free fall motion (i.e., football, bullet).
Fly by Math	VT	12:19.1	this occurs. Modeling, illustrating, and explaining the path of
		SCI.9-12.S9-	reference planes and explaining how and why
Fly by Math	VT	12:6.2	Analyzing significance of experimental data. Predicting the path of an object in different
		SCI.9-12.S9-	
Fly by Math	VT	SCI.9-12.S9- 12:4.1	Collecting significant data by completing multiple trials;
Activity/Lesson	State	Standards	
Grades 9-12			
Vermont Science			
		Grade Expecta	ations
		2007 Scien	
		Smart Skie	es
Line Up with Math	VT	8:45.1	galaxy.
		SCI.7-8.S7-	Identifying and labeling the location of the sun in our solar system and its relationship to the
Line Up with Math	VT	8:23.b	of the molecules in a substance.
		SCI.7-8.S7-	Temperature is a measure of the rate of motion
Line Up with Math	VT	8:23.2	each method of energy transfer.
		SCI.7-8.S7-	convection, and radiation, and using their visual to explain how heat energy travels in different directions and through different materials by
			explain differences among conduction,
Line ob with Math	VI	0.22.d	be. Creating a diagram, model, or analogy to
Line Up with Math	VT	SCI.7-8.S7- 8:22.a	mass objects have and how far apart they may
Line Op with Math	V I	0.22.1	The force of gravity depends on the amount of
Line Up with Math	VT	SCI.7-8.S7- 8:22.1	of gravity is relative to the mass of objects and their distance apart.
			System, and identifying evidence that the force
			gravitational force on objects in the Solar
Line Up with Math	VT	8:21.c	or direction of an object's motion. Describing and explaining the effects of
Lina Lla with Math	VT	SCI.7-8.S7-	Unbalanced forces will cause changes in speed
Line Up with Math	VT	8:21.b	and magnitude.
		SCI.7-8.S7-	straight line, then the forces will reinforce or cancel one another, depending on their direction
Line Up with Math	VT	8:21.a	straight line. If more than one force acts on an object along a
		SCI.7-8.S7-	An object that is not subjected to a force will continue to move at a constant speed and in a
Line Up with Math	VT	8:21.1	of these forces on the motion of the object.)
		SCI.7-8.S7-	before and after it is put into motion (Students include in their diagram or description, the effect
			moving object, the forces acting on the object
			Diagramming or describing, after observing a

			Motion is relative. The motion of an object is
			observed and measured relative to a given
		SCI.9-12.S9-	frame of reference (point of view) (e.g. trees
Fly by Math	VT	12:19.a	flashing by when sitting in a moving vehicle).
		12.1010	Acceleration occurs when an object undergoes
		SCI.9-12.S9-	a change in velocity over time (speed up, slow
Fly by Math	VT	12:19.b	down, change direction).
, .,		SCI.9-12.S9-	Motion is predictable; a falling object increases
Fly by Math	VT	12:19.c	speed in a predictable pattern as it falls.
, .,		12	Motion is predictable; projectile motion
		SCI.9-12.S9-	combines a uniform horizontal motion and free-
Fly by Math	VT	12:19.d	fall motion simultaneously
, .,		12	Explaining how inertia affects the outcome in
			each of a series of situations (i.e., kicking a sand-
		SCI.9-12.S9-	filled football, moving a bowl of soup quickly
Fly by Math	VT	12:20.1	across the table).
, .,		.=.=•	delege in the table).
			An object at rest or moving uniformly (in a
			straight line) will remain so unless acted upon by
			an external unbalanced (net) force (Newton's
			First Law, The Law of Inertia). (e.g., We wear
		SCI.9-12.S9-	seatbelts because our body has a tendency to
Fly by Math	VT	12:20.a	keep moving when the vehicle stops.)
			Investigating (predict, model, illustrate, explain)
			whether the acceleration is greater or less as
			either the mass of the system or the force
			accelerating the mass is changed and using
			data to support your conclusion (e.g., cart with
		SCI.9-12.S9-	variable weights on horizontal table attached to
Fly by Math	VT	12:21.1	a string with weights).
			Investigating quantitatively the acceleration as
			either the mass of the system or the force
			accelerating the mass is changed (e.g., cart with
		SCI.9-12.S9-	variable weights on horizontal table attached to
Fly by Math	VT	12:21.3	a string with weights.)
			Every body continues in its state of rest or in a
			straight line, unless it is compelled to change
		SCI.9-12.S9-	that state by forces impressed upon it (Newton's
Fly by Math	VT	12:21.a	First Law).
			If an unbalanced force acts on an object it will
			accelerate; the acceleration is proportional to
			the net force and inversely proportional to the
			mass of the object (Newton's Second Law
		SCI.9-12.S9-	F=ma). (e.g. A vehicle accelerates more slowly
Fly by Math	VT	12:21.b	when it's full of passengers.)
			Whenever one object exerts a force on a second
			object, a force equal in magnitude but opposite
			in direction is exerted on the first object. Forces
			always arise in pairs (Newton's Third Law). (e.g.,
	l	SCI.9-12.S9-	When you lean against a wall, the wall pushes
Fly by Math	VT	12:21.c	back at you.)

		T1 C C 16 1 C C
		The force of gravity is a universal force of
		attraction between ANY two objects and is
		proportional to the masses of those two objects
		and weakens rapidly with the distance between
		the objects (e.g., More mass produces more
	SCI.9-12.S9-	force; less distance produces more force, such
VT	12:22.a	as bodies in the solar system).
		An electromagnetic force is a universal force
		that acts within and between atoms and is vastly
		stronger than the gravitational forces between
	SCI 9-12 S9-	atoms (strength depends upon how much
VT		charge is present).
VI	12.27.α	An electromagnetic force is a universal force
		that acts within and between atoms and is vastly
		· 1
	001 0 40 00	stronger than the gravitational forces between
	I	atoms (strength depends upon how much
VI	12:28.a	charge is present).
		Predicting, explaining and drawing conclusions
	I	about the direction of movement of substances
VT	12:30.1	across a membrane.
		Predicting the path of an object in different
		reference planes and explaining how and why
VT	12:19.1	this occurs.
		Using modeling and illustrating, to explain how
	SCI.9-12.S9-	distance and velocity change over time for a free
VT	12:19.2	falling object.
		Modeling, illustrating, and explaining the path of
	SCI.9-12.S9-	an object which has horizontal and free fall
VT	12:19.3	motion (i.e., football, bullet).
		Motion is relative. The motion of an object is
		observed and measured relative to a given
	SCI 9-12 S9-	frame of reference (point of view) (e.g. trees
VT	I	flashing by when sitting in a moving vehicle).
	12.10.0	Acceleration occurs when an object undergoes
	SCI 0-12 S0-	a change in velocity over time (speed up, slow
VT		down, change direction).
VI		Motion is predictable; a falling object increases
\/T		
V I	12.19.0	speed in a predictable pattern as it falls.
	00104000	Motion is predictable; projectile motion
\ /T		combines a uniform horizontal motion and free-
VI	12:19.d	fall motion simultaneously
		Explaining how inertia affects the outcome in
		each of a series of situations (i.e., kicking a sand-
_	I	filled football, moving a bowl of soup quickly
VT	12:20.1	across the table).
		Whenever one object exerts a force on a second
		object, a force equal in magnitude but opposite
		in direction is exerted on the first object. Forces
		always arise in pairs (Newton's Third Law). (e.g.,
	SCI.9-12.S9-	When you lean against a wall, the wall pushes
VT	12:21.c	back at you.)
	VT VT VT VT VT VT VT VT VT VT	VT 12:22.a SCI.9-12.S9- 12:27.a SCI.9-12.S9- 12:28.a VT 12:30.1 VT 12:19.1 SCI.9-12.S9- 12:19.1 VT 12:19.2 VT 12:19.2 VT 12:19.3 VT SCI.9-12.S9- 12:19.a VT SCI.9-12.S9- 12:19.a VT SCI.9-12.S9- 12:19.b SCI.9-12.S9- 12:19.c VT SCI.9-12.S9- 12:19.c VT SCI.9-12.S9- 12:19.d

Line Up with Math	VT	SCI.9-12.S9- 12:22.1	Predicting in a variety of situations how gravitational force changes when mass changes or when distance changes.
		SCI.9-12.S9-	The force of gravity is a universal force of attraction between ANY two objects and is proportional to the masses of those two objects and weakens rapidly with the distance between the objects (e.g., More mass produces more force; less distance produces more force, such
Line Up with Math	VT	12:22.a	as bodies in the solar system).